

ARTIFICIAL DEEPENING OF THE ARKANSAS AT WICHITA, KANS.

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The continuous removal of sand for building purposes from the bed of the Arkansas River immediately below the Douglas Avenue Bridge at Wichita has lowered the

Weather Bureau at Wichita were begun in the latter half of 1897, using a gage that had been constructed by the city of Wichita. The height of the zero of this gage was, so far as can now be determined, 1,284.7 feet above sea level. It was graduated from zero to 13 feet.

In 1905 the Weather Bureau constructed a new gage, the zero of which was placed at 1,284.7 feet above sea

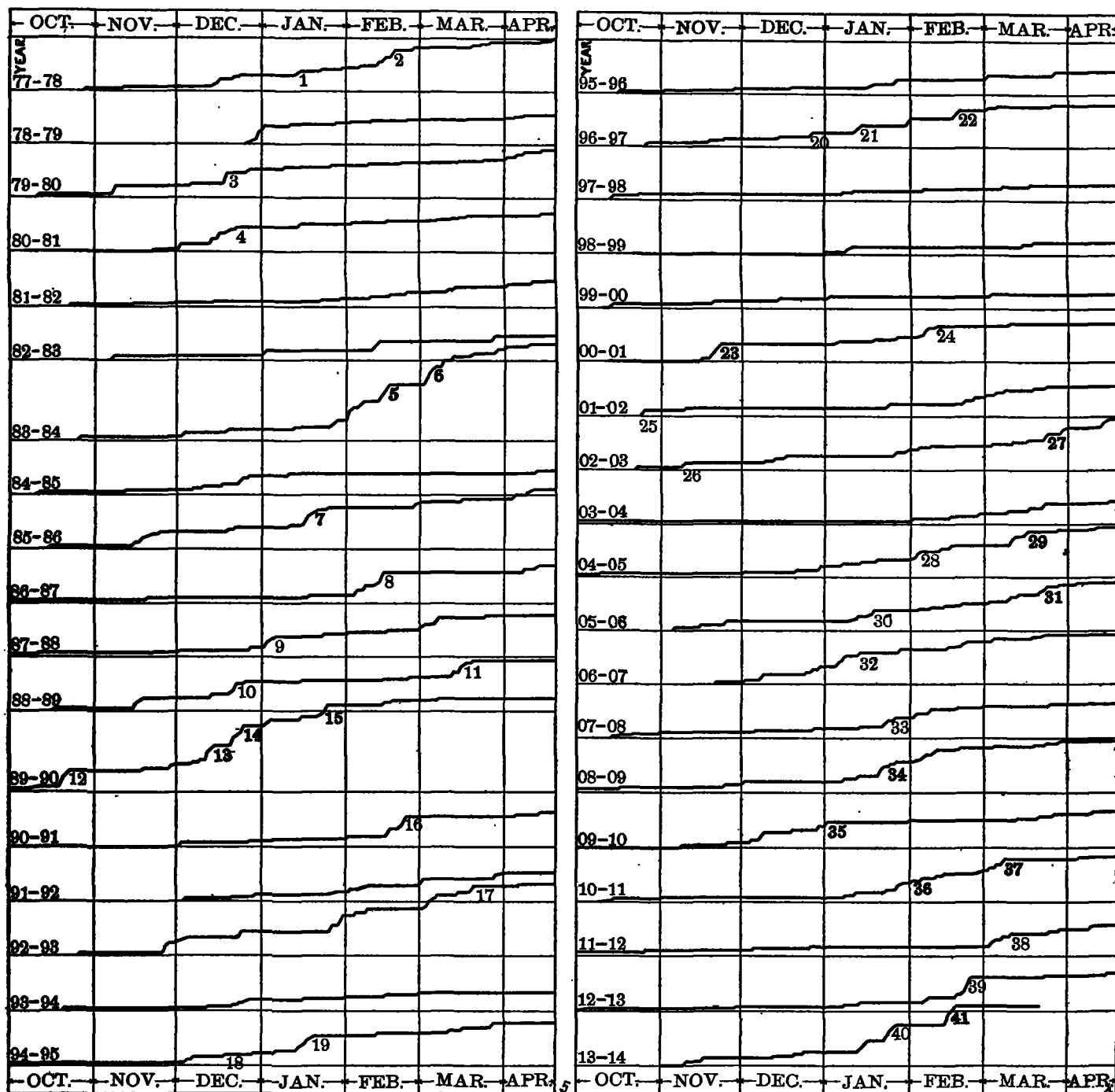


FIG. 5.—Profiles of accumulated precipitation at Los Angeles, Cal., for each of the 37 years, 1877-78 to 1913-14.

channel of the river at that point probably as much as 5 or 6 feet during the last 10 years.

The width of the river bed at Wichita is about 500 feet, but the channel at that point is not more than about 70 feet wide.

The observations of stages of water in the river by the

level. This gage was graduated from -0.5 to 12 feet. In 1907 it became necessary to extend the lower section of the gage from -0.5 to -3.0 feet. In 1909 the Weather Bureau erected a second new gage on the Douglas Avenue Bridge. This gage was at first graduated from -3.0 to 12 feet, but later, by reason of the lowering of

the channel, it was extended to -6.5 feet, at which point it remains. Thus the graduation of the gage has been extended from zero in 1897 to 6½ feet below zero in 1911. There has been no change in the zero of this gage.

In order to determine the approximate amount of lowering, a study of the gage relations between Wichita and Hutchinson, Kans., has been made. The last-

Bureau, using the gage of the United States Geological Survey, continued the series of daily readings at Hutchinson through the months of April to August of each year until 1913, when the station was finally closed. Thus there is available two series of comparative readings, the first extending from 1898 to 1903 and the last from 1909 to 1912.

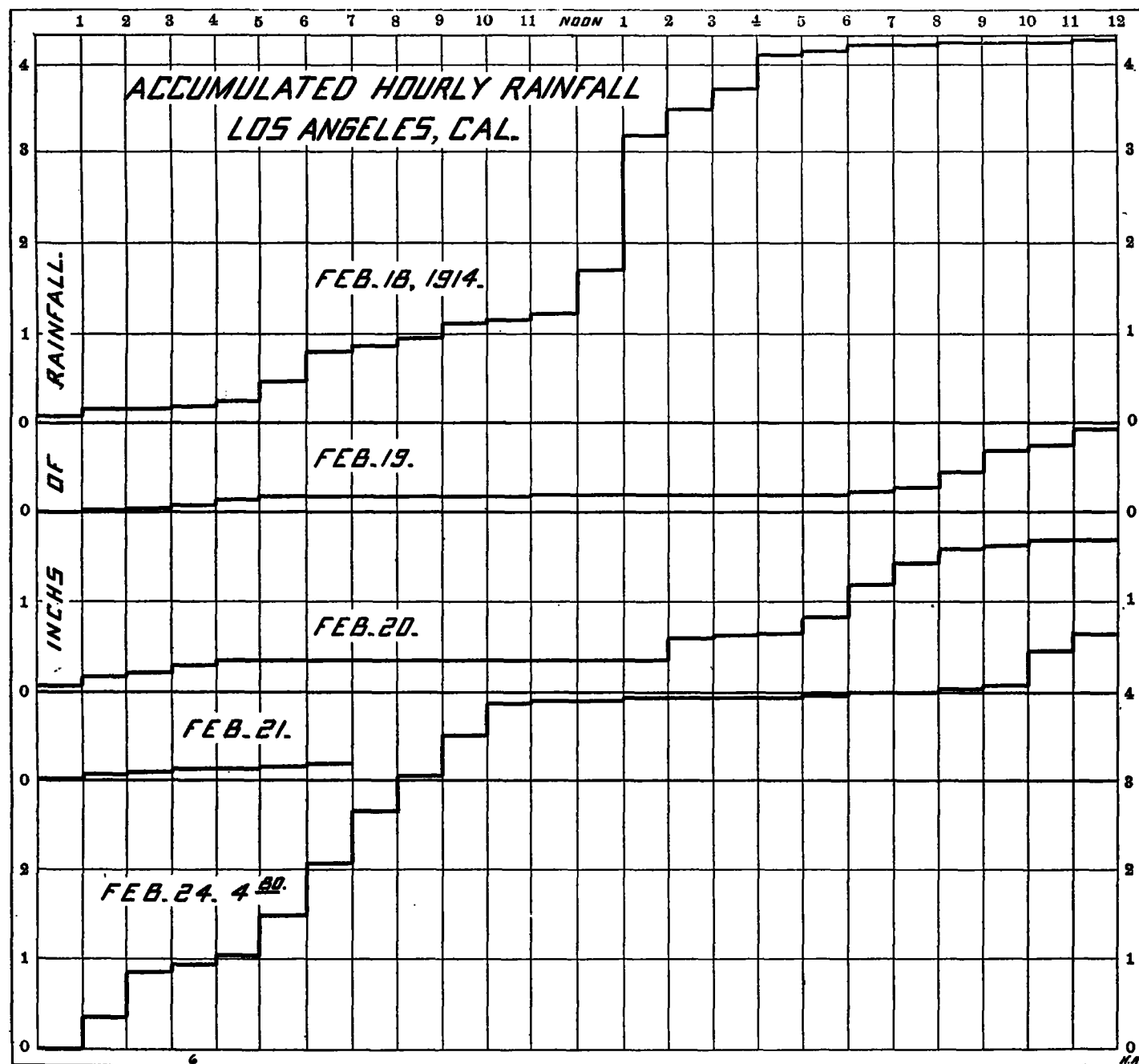


FIG. 6.—Accumulated hourly rainfalls, Los Angeles, Cal., February 18-21 and 24, 1914.

named point is 43 miles up river from Wichita. Daily gage readings at Hutchinson were maintained by the United States Geological Survey from 1896 to 1903. During six years of that time corresponding readings were made at Wichita. Beginning in 1909, the Weather

Inasmuch as the zeros of both gages were set approximately at the bed of the river, the monthly mean values should enable us to determine whether or not the gage relations which existed in the early period continued throughout the second period.

The comparative means are given below.

TABLE 1.—*Monthly mean river gage readings, Hutchinson and Wichita, Kans.*

[First period: 1898-1903.]

Station.	April.	May.	June.	July.	August.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Hutchinson.....	2.0	2.2	3.0	2.0	1.7
Wichita.....	2.3	2.8	3.9	2.2	1.9
Difference.....	0.3	0.6	0.9	0.2	0.2

[Second period: 1909-1912.]

Hutchinson.....	1.4	1.6	1.6	1.0	1.4
Wichita.....	-2.7	-2.4	-2.6	-3.4	-3.2
Difference.....	-4.1	-4.0	-4.2	-4.4	-4.6

There was no change in the zero of either of the above gages during the life of the observations. The results show that during the earlier period the Wichita gage readings were uniformly a little higher than those of Hutchinson, while the means of the later period show that the Wichita gage readings were, on the average, about 4 feet lower than those of Hutchinson and about the same amount lower than those of the earlier period. We also note that the means of the second period at Hutchinson are lower than for the first period by as much as a foot or more in the months of June and July. The lesser values of the second period may have been due to an actual diminution of stream-flow, since the quantity of the latter varies from year to year.

We assume that the stream-flow at Hutchinson and Wichita is practically identical, since no diversion of water is made between the two points. The character of the bottom is the same at both points, viz, sandy and shifting. So far as known, no considerable quantity of sand was removed from the river channel at Hutchinson.

The removal of sand from the river bed at Wichita would tend to cause a flow of sand downstream, in the channel, and such flow would continue until the depressions caused by the removal of sand were filled up.

Mr. S. P. Peterson, official in charge at Wichita, Kans., writes:

In my opinion the river bed has lowered about 6 feet since the pumping of sand on a large scale was begun in 1904. The Big Arkansas River occasionally becomes dry above the point of confluence of this river with the Little Arkansas River, but there is always some water flowing into the big river from the little river, and this water passes by the Weather Bureau gage on the Douglas Avenue Bridge, about one-third of a mile below the point of confluence. The lowest stage recorded prior to 1904 when the Big Arkansas River was dry about the point of confluence was +0.7 foot, in November, 1897. The lowest stage observed in the past few years under similar conditions of dryness of the big river was -5.4 feet. The stream-flow passing by the gage was probably the same in both cases, as the volume of water from the little river is usually quite small, and especially so in dry seasons. The difference between the two stages mentioned is 6.1 feet. This would seem to indicate approximately the amount of lowering of the bed of the Big Arkansas River since the pumping of sand was begun. The stage of -5.4 feet, under the condition of dryness mentioned, was first observed in June, 1911, and this same stage (estimated) was observed early during this current year, the Big Arkansas River being dry above the point of confluence. It would therefore seem that a correction of about +6 feet should be applied to gage readings from 1911 to the present time in order to make these readings comparable with the readings made before 1914.